Amendments to the Claims

1. (Original) A rotational position sensor for sensing a rotational position of a rotating object, the rotational position comprising:

a hub;

a code disk attached to the hub;

a housing for holding the hub and the code disk;

wherein said code disk includes markings arranged around its circumference, the markings forming a unique pattern over a predetermined portion of the circumference, said unique pattern identifying a unique rotational position.

2. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 1, the rotational position further comprising:

a PC board having a photodetector; and

a light source that shines a light past the markings onto the photodetector, the photodetector reading the light and dark images to identify the rotational position of the code disk.

3. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 2, wherein:

the code disk is made of a metal material and the markings around its circumference are formed of cut-outs.

4. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 2, wherein:

the PC board is a flexible ribbon cable having a main panel and sensor panel, a microprocessor being located on the main panel and the photo detector being located on the sensor panel.

5. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 2, wherein:

the markings comprise equally sized bits that form the unique pattern; and

the photodetector reads more than the number of bits necessary to identify the unique rotation position so that it is able to read several rotational positions simultaneously.

6. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 2, wherein:

the photodetector is a charge coupling device.

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7. (Amended) The rotational position sensor for sensing a rotational position of a rotating object of claim 2, wherein:

the photodetector ~~continuously~~ reads the code disk at timed intervals, and the light source ~~LED~~ is timed to flash simultaneously with the reading of the photodetector.

8. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 2, wherein:

the PC board includes a plurality of sensors for determining the number of revolutions of the code disk.

9. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 8, wherein:

the plurality of sensors are Hall sensors.

10. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 9, wherein:

each revolution of the code disk has more than one signal combination provided by the Hall sensors to provide a more accurate count of the code disk revolution.

11. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 2, wherein:

the markings comprise equally sized bits that form the unique pattern; and

each bit comprises a plurality of pixels, the plurality of pixels being more than the number of pixels necessary to define each bit so that the photo detector is able to oversample each bit to more reliably identify it.

12. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 1, the rotational position further comprising:

a turn ring; and

a plurality of sensors;

wherein the turn ring cooperates with a plurality of sensors for determining the number of revolutions of the code disk.

13. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 12, wherein:

the turn ring has gear teeth that mesh with gear teeth on the housing of the position sensor.

14. (Original) The rotational position sensor for sensing a rotational position of a rotating object of claim 12, wherein:

the turn ring has a magnet on its circumference that travels over the plurality of sensors, energizing specific sensors depending on the number of revolutions of the code disk.

15. (Amended) A rotational position sensor comprising;

a housing containing a hub including a generally circular shaped disk having a first ledge and a second ledge, a code disk including a generally circular shaped disk rigidly fixed to the

first ledge of the hub, and a turn ring on the code disk having ~~outwardly facing~~ gear teeth ~~on an inside diameter~~ that engage gear teeth on the ~~inside diameter of the~~ housing.

16. (Original) The rotational position sensor of claim 15, further comprising;

a PC board including a photodetector that reads the rotational position of the code disk and a plurality of sensors that determine whether the code disk undergoes any revolutions.

17. (Original) The rotational position sensor of claim 16, wherein;

the code disk contains markings arranged around its circumference forming a unique pattern over a predetermined portion of the circumference, said unique pattern identifying a specific rotational position, and the photodetector reading the markings to identify the unique rotational position of the code disk.

18. (Original) The rotational position sensor of claim 17, further comprising;

a light source that shines a light through the markings in the code disk onto the photodetector.

19. (Original) The rotational position sensor of claim 18, wherein;

the markings are formed of cut-outs in the code disk.

20. (Original) The rotational position sensor of claim 17, wherein;

the markings comprise equally sized bits that form the unique pattern, each bit comprising a plurality of pixels, the plurality of pixels being more than the number of pixels necessary to define each bit so that the photo detector is able to oversample each bit to more reliably identify it.

21. (Original) The rotational position sensor of claim 16, wherein;

the turn ring has a magnet on its circumference that travels over the plurality of sensors, energizing specific sensors depending on the number of revolutions of the code disk.

22. (Original) The rotational position sensor of claim 21, wherein;

the second ledge drives the rotation of the turn ring in a hypocycloidic path around the gear teeth in the housing.

23. (Original) The rotational position sensor of claim 22, wherein;

the housing includes a cover and a base; and

the gear teeth in the housing are on the cover.

24. (Original) The rotational position sensor of claim 22, wherein;

the housing includes a cover and a base; and

the gear teeth in the housing are on the base.

25. (Original) A position sensor for sensing the rotational position of a steering wheel comprising;

a housing, a hub, a code disk, a turn ring and a PC board;

wherein the housing holds said hub, code disk, turn ring and PC board therein;

wherein the code disk is fixed to the hub and includes markings arranged around its circumference, the markings forming a unique pattern over a predetermined portion of the circumference, said unique pattern identifying a specific rotational position.

26. (Original) The position sensor for sensing the rotational position of steering wheel of claim 25, wherein;

the turn ring is placed on the hub, the turn ring having gear teeth on its inner diameter that mesh with gear teeth on the housing of the position sensor.

27. (Original) The position sensor for determining the rotational position of steering wheel of claim 26, wherein;

the PC board includes a photodetector and a plurality of sensors, the markings comprising equally sized bits that form the unique pattern the photodetector reading the bit sequence of the code disk to determine the rotational position of the code disk, and the plurality of sensors responding to a magnet on the turn ring to determine whether the code disk rotates more than 360 degrees.

28. (Original) The position sensor for sensing the rotational position of steering wheel of claim 27, wherein;

the PC board is made of a flexible ribbon cable that can be configured into different shapes.

29. (Original) The position sensor for determining the rotational position of steering wheel of claim 27, further including;

a light emitting diode (LED) attached to the PC board, the LED shining a light through the markings of the code disk onto the photodetector.

30. (Original) The position sensor for determining the rotational position of steering wheel of claim 29, wherein;

the photodetector continuously reads the code disk at timed intervals, and the LED is timed to flash simultaneously with the reading of the photodetector.

31. (Original) The position sensor for determining the rotational position of steering wheel of claim 27, wherein;

the photodetector reads more than a predetermined number of bits so that it is able to read several continuous rotational positions simultaneously, ensuring the accuracy of the readings by confirming they form a series.

32. (Original) The position sensor for determining the rotational position of steering wheel of claim 25, wherein;

the markings are formed of cut-outs.

33. (Original) The position sensor for determining the rotational position of steering wheel of claim 32, wherein;

the markings comprise equally sized bits that form the unique pattern; and

each bit comprises a plurality of pixels, the plurality of pixels being more than the number of pixels necessary to define each bit so that the photo detector is able to oversample each bit to more reliably identify it.

34. (New) A rotational position sensor comprising:

a housing holding a hub, a code disk and a turn ring, wherein the code disk is rigidly fixed to the hub so as to have the same rotational axis thereof and including markings thereon to identify its rotational position;

wherein the turn ring is placed around the hub and is rotatable relative thereto, the turn ring having a rotational axis different from that of the hub, and wherein the turn ring indicates whether the code disk has undergone a full revolution; and

wherein the rate of rotation of the turn ring and the hub are different.

35. (New) The rotational position sensor of claim 34 wherein the turn ring has gear teeth that mesh with gear teeth on the housing, such that when the hub rotates relative to the housing, the rate of rotation of the turn ring being slower than the hub.